

Online Research @ Cardiff

This is an Open Access document downloaded from ORCA, Cardiff University's institutional repository: <https://orca.cardiff.ac.uk/id/eprint/107770/>

This is the author's version of a work that was submitted to / accepted for publication.

Citation for final published version:

Cuenca, Jerome A. ORCID: <https://orcid.org/0000-0003-1370-1167>, Slocombe, Daniel R. ORCID: <https://orcid.org/0000-0003-3590-6075> and Porch, Adrian ORCID: <https://orcid.org/0000-0001-5293-8883> 2017. Corrections to 'temperature correction for cylindrical cavity perturbation measurements'. IEEE Transactions on Microwave Theory and Techniques 65 (12) , p. 5078. 10.1109/TMTT.2017.2751550 file

Publishers page: <http://dx.doi.org/10.1109/TMTT.2017.2751550>
<<http://dx.doi.org/10.1109/TMTT.2017.2751550>>

Please note:

Changes made as a result of publishing processes such as copy-editing, formatting and page numbers may not be reflected in this version. For the definitive version of this publication, please refer to the published source. You are advised to consult the publisher's version if you wish to cite this paper.

This version is being made available in accordance with publisher policies.

See

<http://orca.cf.ac.uk/policies.html> for usage policies. Copyright and moral rights for publications made available in ORCA are retained by the copyright holders.



Corrections to “Temperature Correction for Cylindrical Cavity Perturbation Measurements”

Jerome A. Cuenca^{ID}, Daniel R. Slocombe, and Adrian Porch

IN THE above paper [1], it has come to the attention of the authors that a typographical error exists in (16) and (17). The error, while small in syntax, has a large impact on the understanding behind the explained technique. Reference [1, eq. (15)] states that by subtracting the fractional frequency shifts of the sample perturbed and the unperturbed case, any resultant fractional frequency shift is caused by the temperature dependent properties of the sample, if any. Now, the printed and erroneous [1, eq. (16)] should be

$$\varepsilon_1(T) \approx -2 \left[\frac{f_s(T) - f_0(0)}{f_0(0)} \right] \frac{V_c}{V_s} G_{\text{mnp}} + 1. \quad (1)$$

We note that (16) incorrectly states that the unperturbed frequency (f_0) is a function of temperature. This is incorrect since all temperature dependence in the unperturbed state is already addressed in [1, eq. (15)]. Additionally, the fractional frequency shift is normally taken with respect to the reference unperturbed frequency f_0 as opposed to f_s ; however, since the relative difference in f_s and f_0 is small at gigahertz frequencies, this is not a large issue. Reference [1, eq. (16)]

should be printed as (1), where $f_s(T) = f_s(0) \times (1 + ((\Delta f_s(T))/f_s(0)))$ is the temperature dependent frequency while the erroneous $f_0(T)$ has been replaced with $f_0(0)$, the unperturbed frequency taken at a reference temperature. All temperature dependence is addressed in $f_s(T)$ and if there was no temperature dependence, $f_s(T)$ would be a constant and the original cavity perturbation approximation would apply. Similarly, [1, eq. (17)] should be printed as

$$\varepsilon_2(T) \approx \left[\frac{1}{Q_s(T)} - \frac{1}{Q_0(0)} \right] \frac{V_c}{V_s} G_{\text{mnp}} \quad (2)$$

where $(1/(Q_s(T))) = ((BW_s(0))/(f_s(T))) \times (1 + ((\Delta BW_s(T))/(BW_s(0))))$ is the reciprocal of the temperature dependent quality factor and $Q_0(T)$ has been replaced with $Q_0(0)$ which is the unperturbed quality factor at a reference temperature.

REFERENCES

- [1] J. A. Cuenca, D. R. Slocombe, and A. Porch, “Temperature correction for cylindrical cavity perturbation measurements,” *IEEE Trans. Microw. Theory Techn.*, vol. 65, no. 6, pp. 2153–2161, Jun. 2017.

Manuscript received July 20, 2017; revised July 31, 2017; accepted August 7, 2017. Date of publication October 9, 2017; date of current version December 12, 2017. The Ph.D. work of J. A. Cuenca was supported by Merck KGaA, Darmstadt, Germany, and the U.K. Engineering and Physical Sciences Research Council under Grant EP/K502819/1. Information on the presented data can be found in the Cardiff University data catalogue at <http://doi.org/10.17035/d.2017.0030964432>. (Corresponding author: Jerome A. Cuenca.)

The authors are with the School of Engineering, Cardiff University, Cardiff CF24 3AA, U.K. (e-mail: cuencaj@cardiff.ac.uk; slocomed1@cardiff.ac.uk; porcha@cardiff.ac.uk).

Digital Object Identifier 10.1109/TMTT.2017.2751550